



**Informal Dispute Resolution
Presentation
By
Fields Brook Action Group
To
U.S. Environmental Protection Agency

Regarding
Detrex – Fields Brook DNAPL Issues

May 31, 2006
Cleveland, Ohio**

Fields Brook Consent Decree Obligations

- **FBAG required to perform Remedial Action and then implement O&M Plan**
- **O&M Plan only addresses monitoring at site (no excavation requirement stated)**
- **Performance Standards limited to areas of exposure as follows:**
 - **FWA – Top 1 foot of soil**
 - **SOU – Scour Zone of Brook sediment**
- **Traditional “reopeners” not in Consent Decree**

Fields Brook Consent Decree Obligations

- **FBAG has completed remediation of SOU and FWA in compliance with CD/SOW**
 - **Historical contamination excavated to cutlines in SOU and FWA soils**
 - **Finding of completion issued by U.S. EPA 9/30/03**
- **Response actions at source control properties excluded from CD (paragraph 85)**
- **Response actions for source control properties to prevent recontamination were conducted under separate SC Order (para. W, X)**

Detrex Source Control Obligations

- **Source Control RI/FS and 90% Design documents concluded that DNAPL at the Detrex facility had the potential to recontaminate Fields Brook sediment and DS Tributary (UAO paragraphs 36, 44, and 2004 Five Year Review)**
- **Detrex was required to design and implement source control at its facility to prevent DNAPL recontamination to Fields Brook and DS Tributary (UAO para. 45)**

Detrex Source Control Obligations

- **The data indicate that the DNAPL discovered in Fields Brook in 2005 has the same chemical constituents as the pooled DNAPL on the Detrex site and that excavated in 2001**
- **Current conditions result from a failure of source control at the Detrex facility after completion of remediation of SOU and FWA by the FBAG**

Overview of Detrex Site Conditions

- **250,000 to 500,000 gallons of pooled/mobile DNAPL (based on Detrex DNAPL “plume” definition) remain in the subsurface at the Detrex facility - not addressed by source control activities to date**
- **This DNAPL pool has not reached residual state and is moving through multiple pathways in the subsurface formation(s) from the source area to adjacent properties**

Overview of Detrex Site Conditions

- **Source control actions by Detrex have not prevented DNAPL migration to Fields Brook, DS Tributary and other areas**
- **Unless effective source control actions are implemented by Detrex at its facility, DNAPL will continue to recontaminate Fields Brook, DS Tributary and other areas**

Causes of Detrex Source Control Failure

- **DNAPL was not confined to northeast and north central portion of facility as assumed by Detrex (SC RI/FS 4.3.9)**
 - **DNAPL movement is not consistent with groundwater flow**
 - **DNAPL present at multiple locations at and adjacent to facility and it is moving**
 - **Extraction well system was inadequate and ineffective**

Causes of Detrex Source Control Failure

- **DNAPL “Plume” mapped by Detrex understated extent of pooled DNAPL locations**
 - **DNAPL present at slurry wall when constructed**
 - **DNAPL “Plume” map does not incorporate other known locations at RMI property, slurry wall and CEI underground cable line and old Detrex outfall**

Causes of Detrex Source Control Failure

- **Geologic site model was incorrect, unsupported by the data and failed to reflect pathways from DNAPL source area to Fields Brook**
- **Slurry wall system does not contain or prevent DNAPL from migrating off the Detrex facility**

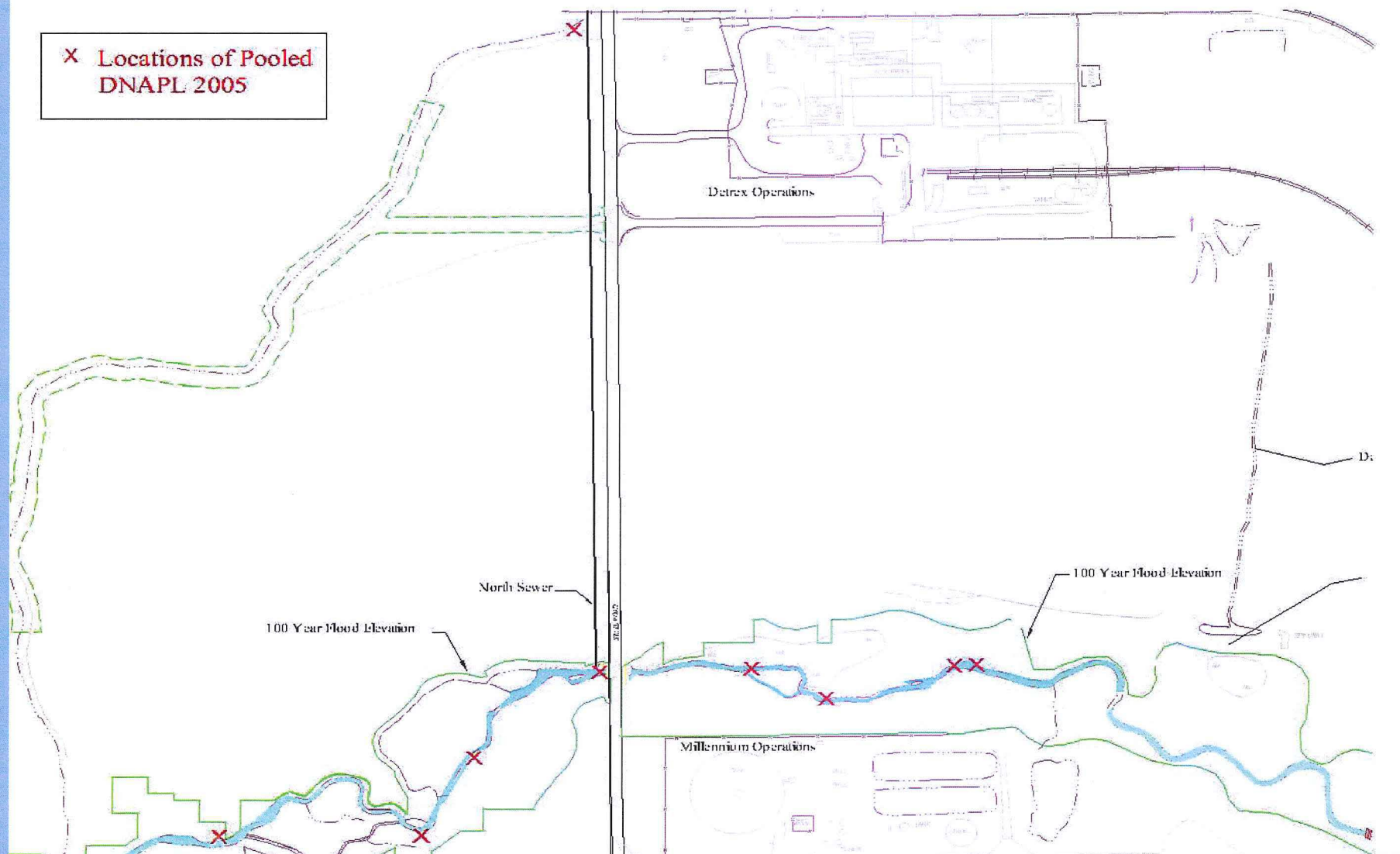
2005 DNAPL Identification and Delineation Study by FBAG

Elements of the investigation

- DNAPL discovered during routine O&M activities**
- Review of historical documents**
- Mapping of the clay lacustrine layer using approximately 160 + Geoprobe ® borings**
- Field screening (headspace PID readings)**
- Trenching parallel to and across Fields Brook**
- DNAPL and soil sampling with limited dye testing**
- Independent evaluations by DNAPL experts including visual observations**

2005 DNAPL Study Findings

- **9 locations of pooled (mobile) DNAPL in EUs 8, 6 and 5, including**
 - **Surficial pooled DNAPL at the base of the State Road Sewer and DS Tributary (as it crosses State Road)**
 - **DNAPL chemically consistent with the material removed in 2001 that originated from Detrex facility**



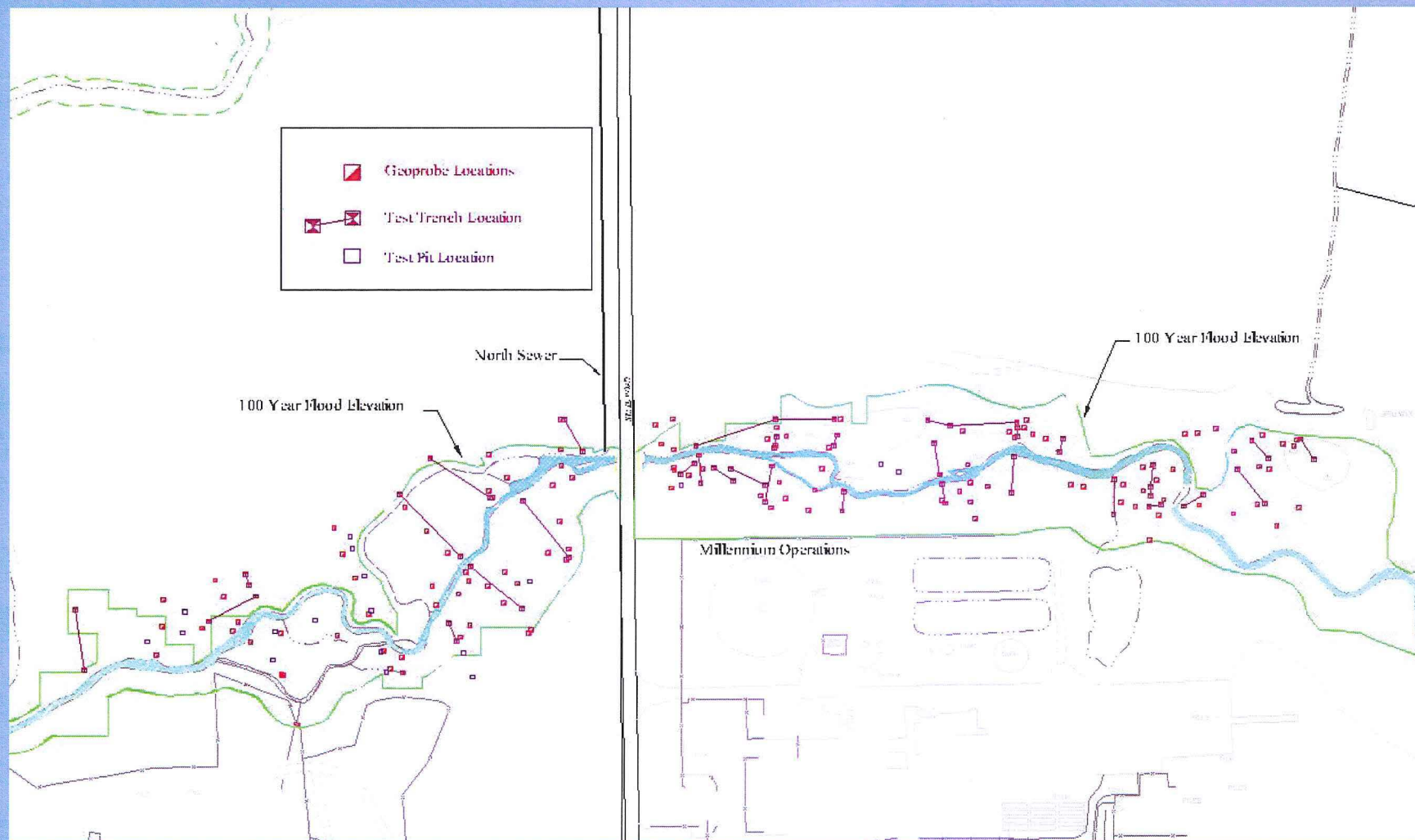
Containment of DNAPL Migration Along Fields Brook

- **Three containment trenches were constructed in Fields Brook**
- **Two trenches for each potential pathway along Fields Brook**
- **Each containment trench was constructed so that any DNAPL migrating along Fields Brook would be contained and detected**
- **Results – no DNAPL found to date in trenches**

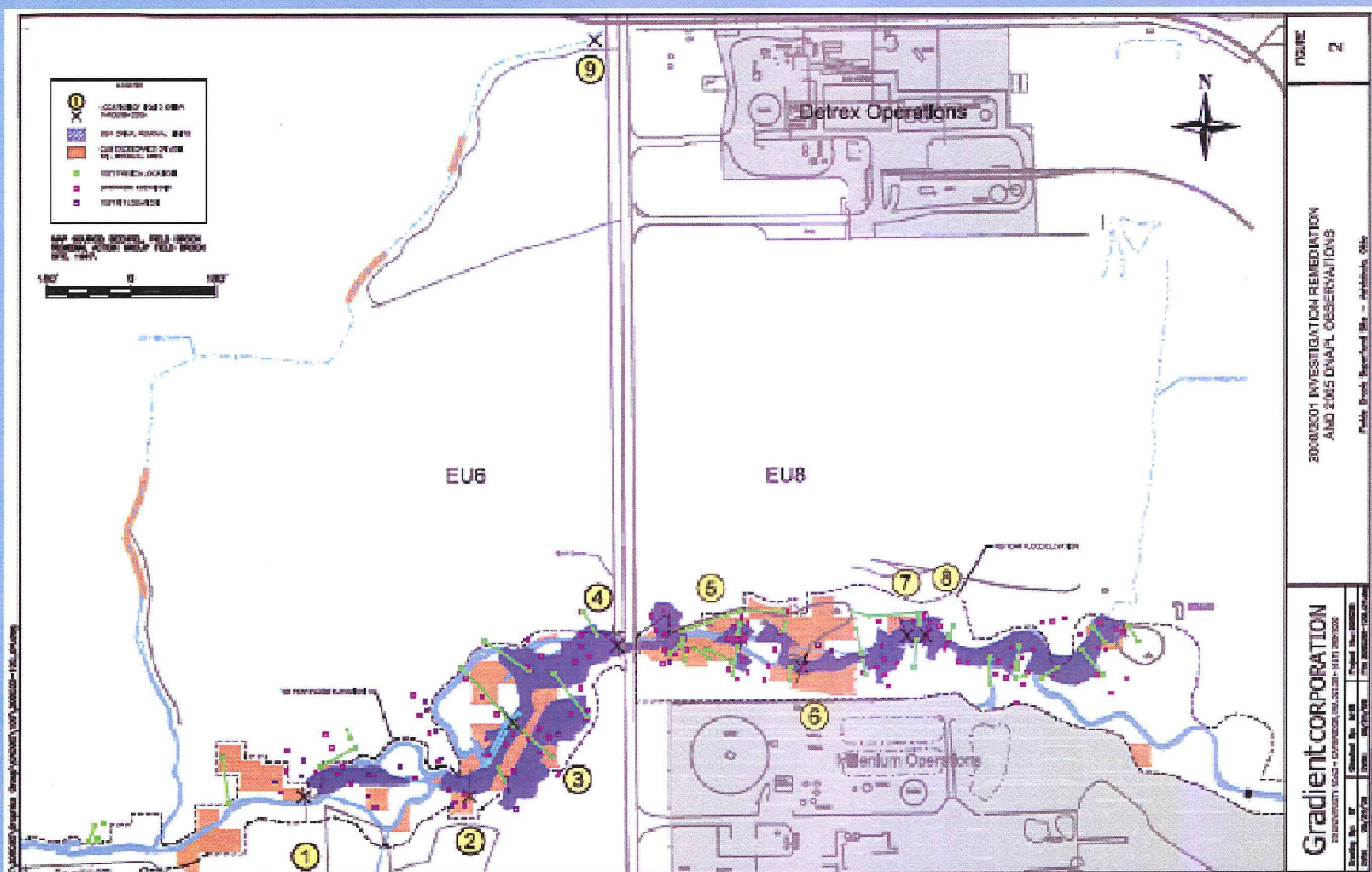
What FBAG did in 2001 to Clean up DNAPL Contamination

- Installed 33 trenches, 18 pits and 122 geoprobe borings to delineate extent of DNAPL and define excavation areas**
- Excavated approximately 28,000 cubic yards of soil to a depth up to 6 feet in Fields Brook and flood plain areas**
- Removed all pooled DNAPL at the site based on visual observations or with high PID readings**

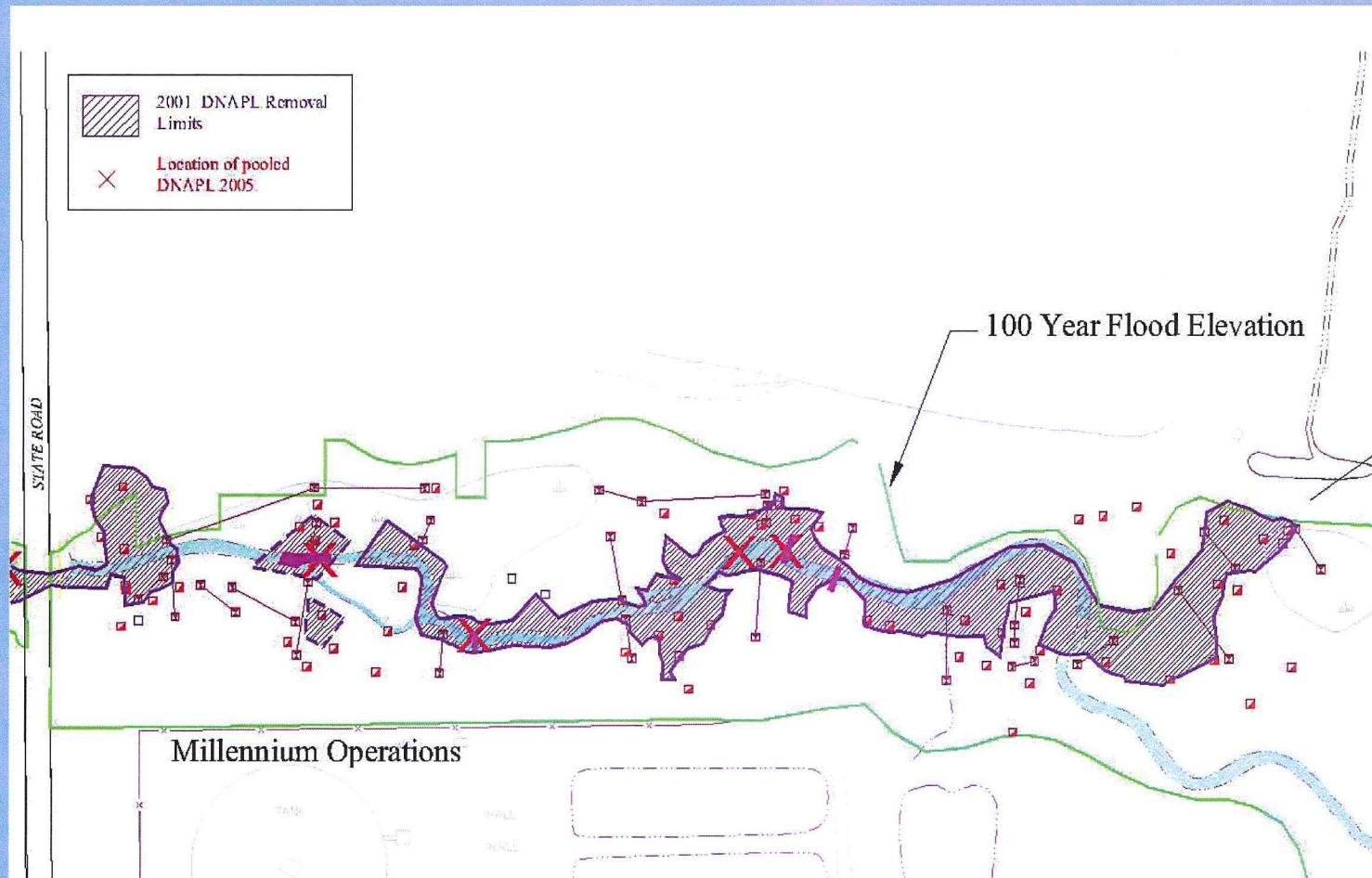
Extent of FBAG 2000/2001 Investigation



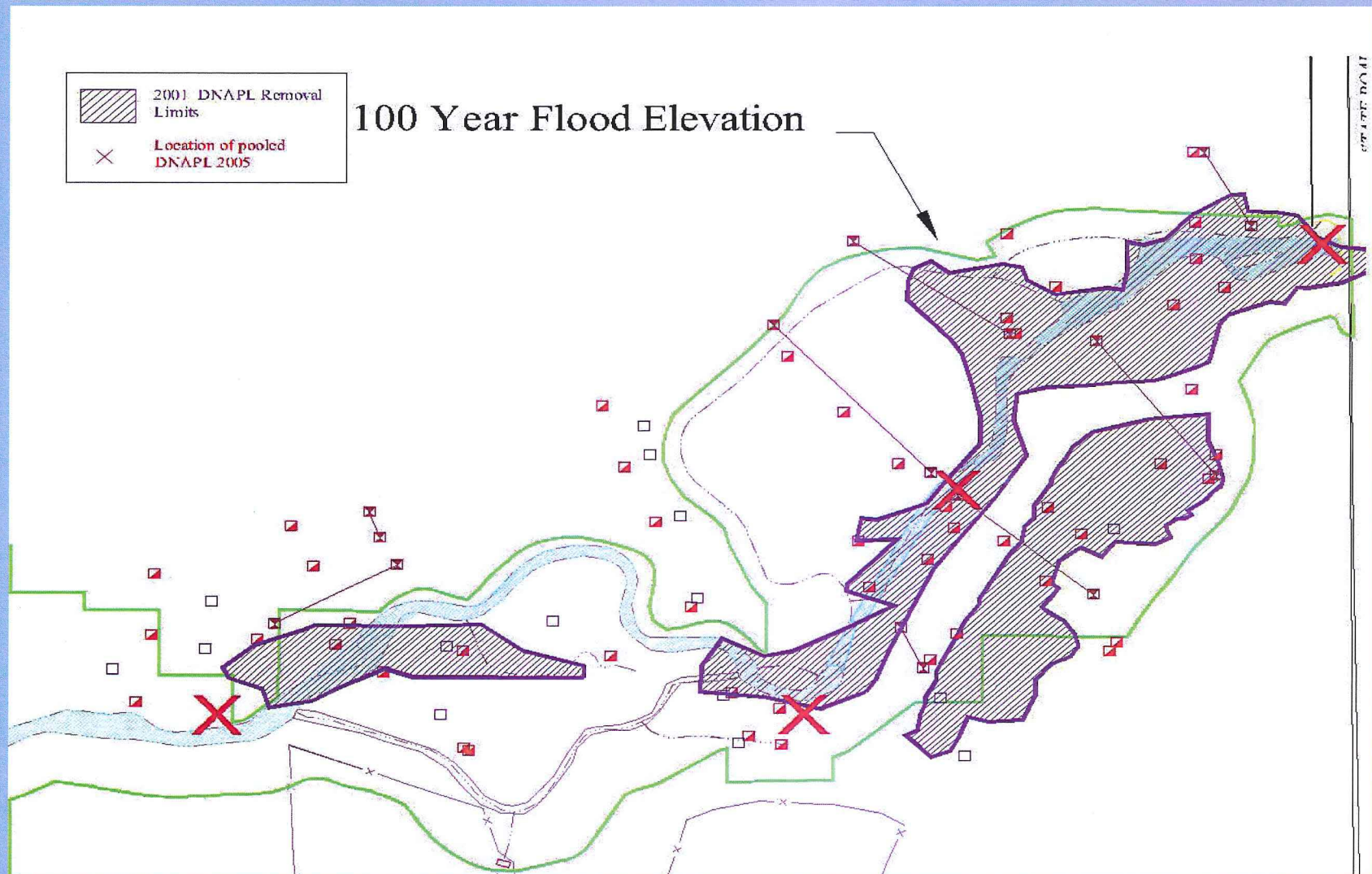
2001 Remedial Action



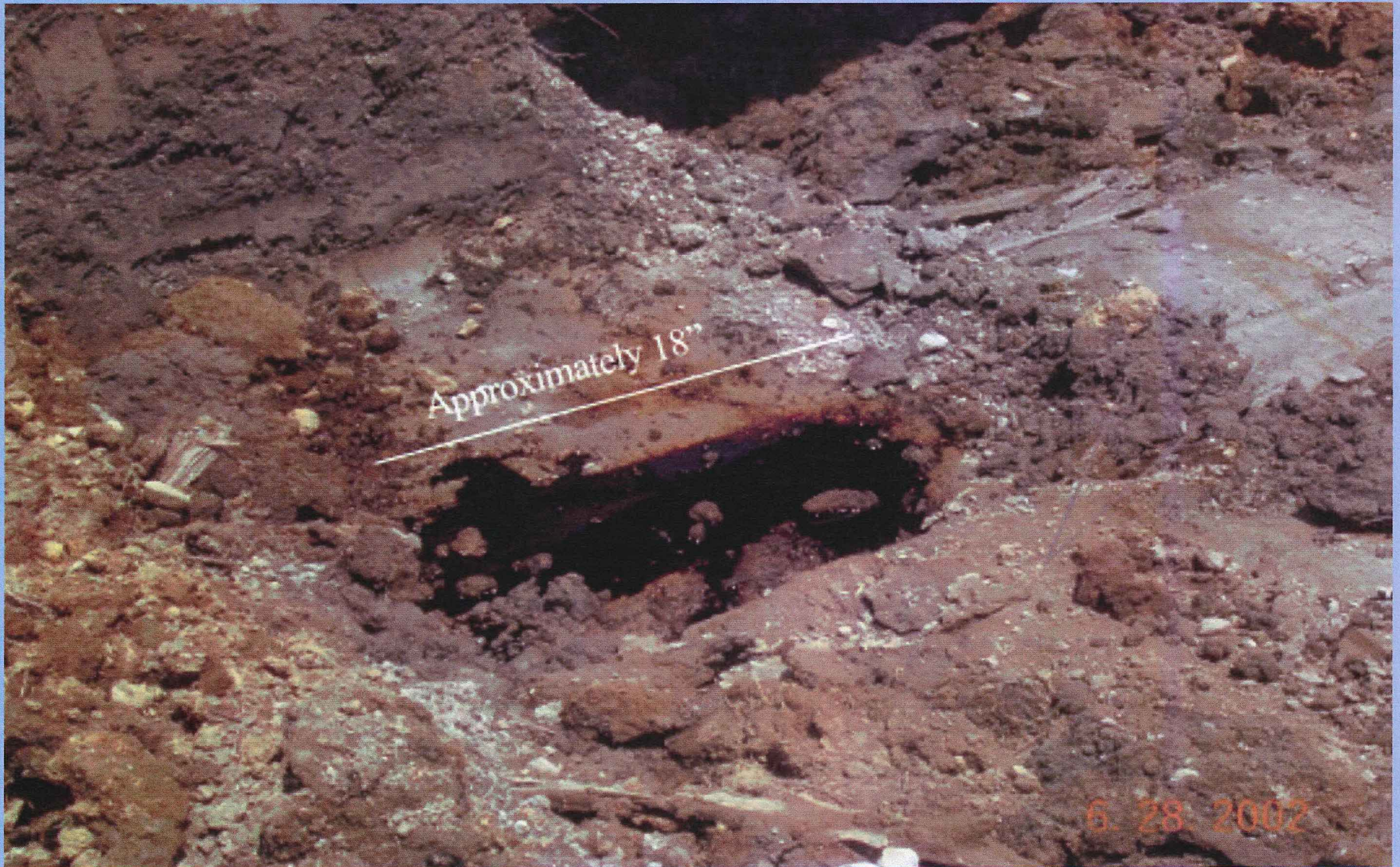
Comparison of 2001 Removal vs. 2005 Locations EU-8



Comparison of 2001 Removal vs. 2005 Locations EU-6



Example of DNAPL in 2001

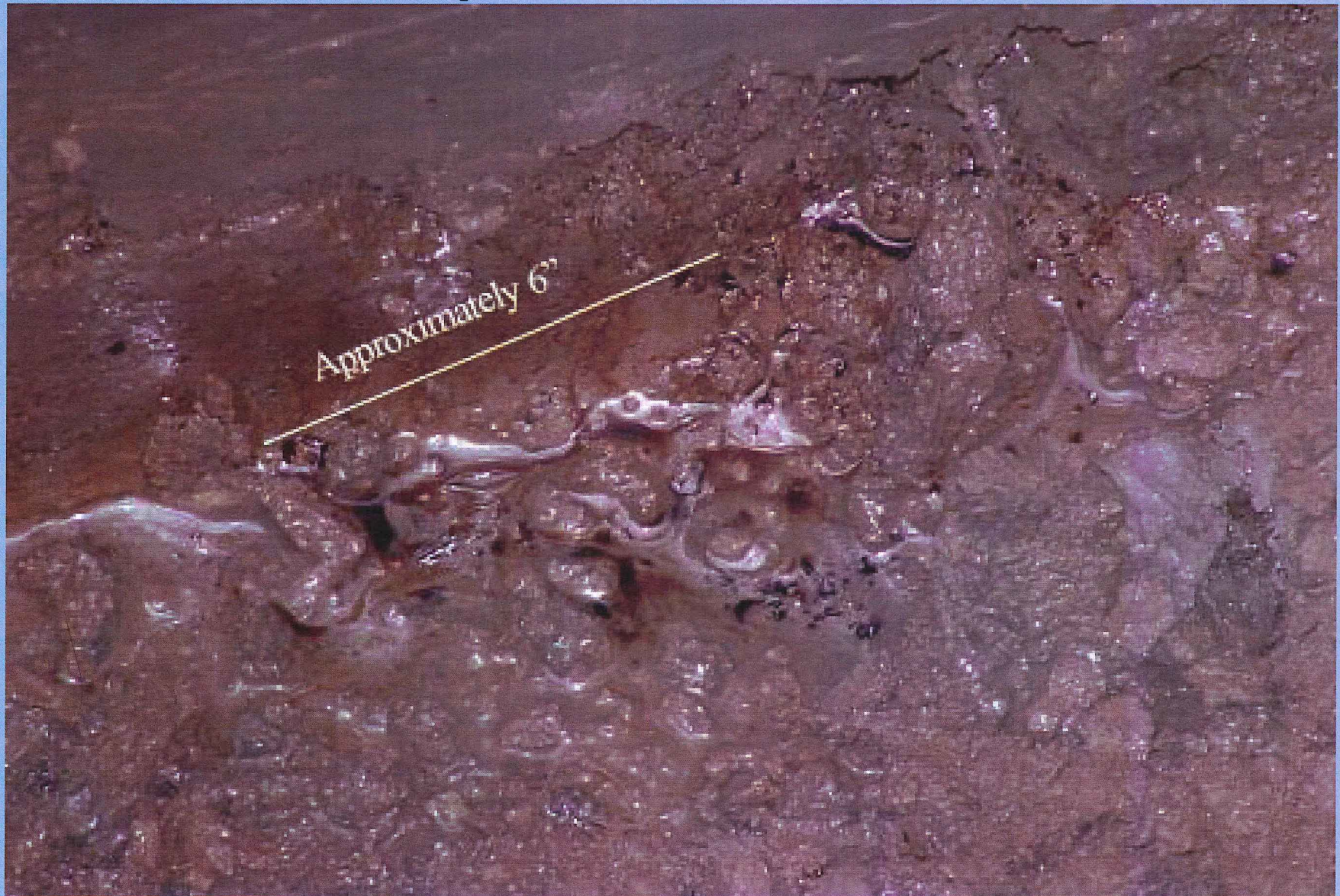


6. 28. 2002

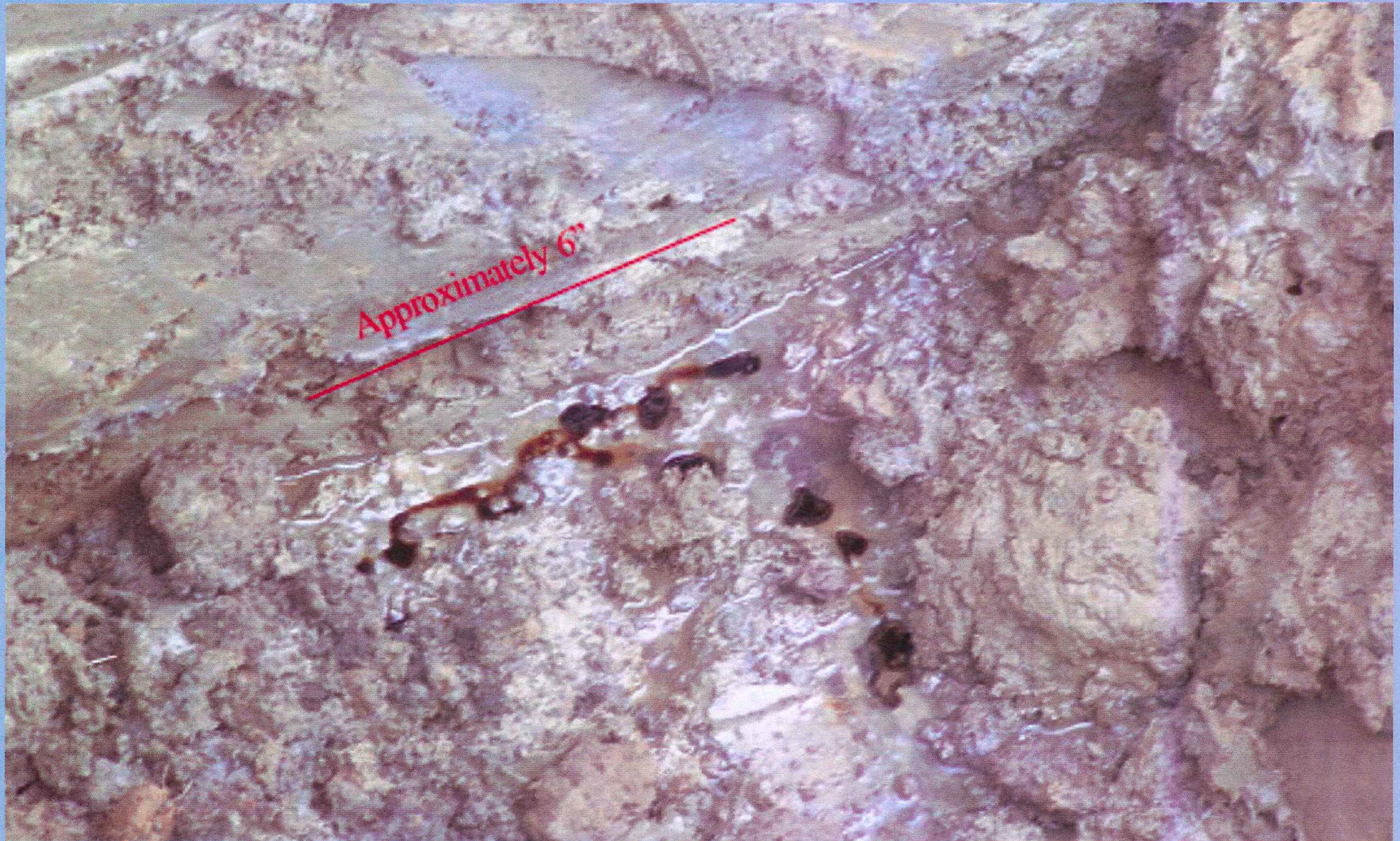
Example of DNAPL in 2001



Example of DNAPL in 2005



Example of DNAPL in 2005



Example of DNAPL 2005

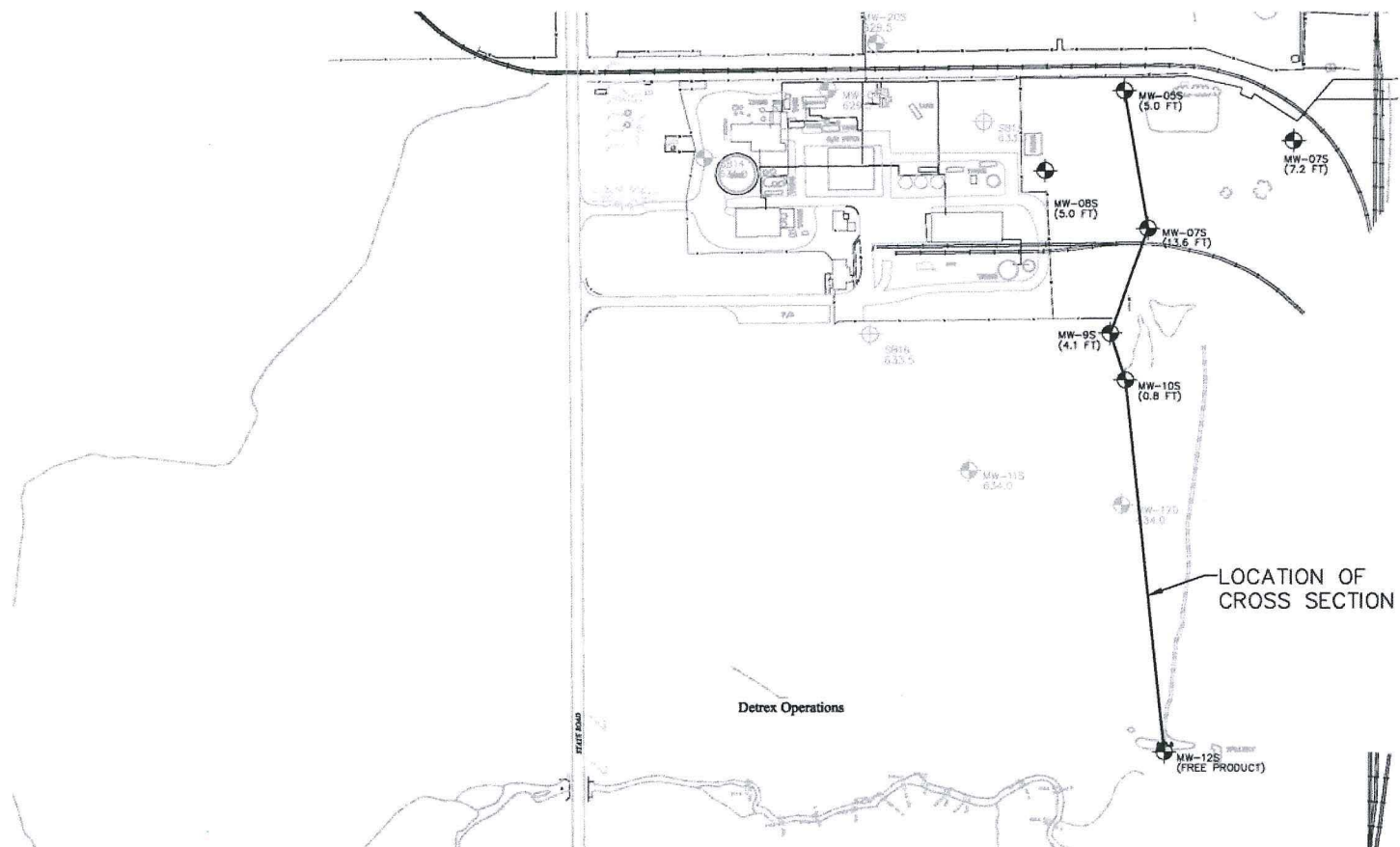


DETREX REMEDIAL SYSTEM DESIGN WAS BASED ON INCORRECT ASSESSMENT OF SITE CONDITIONS

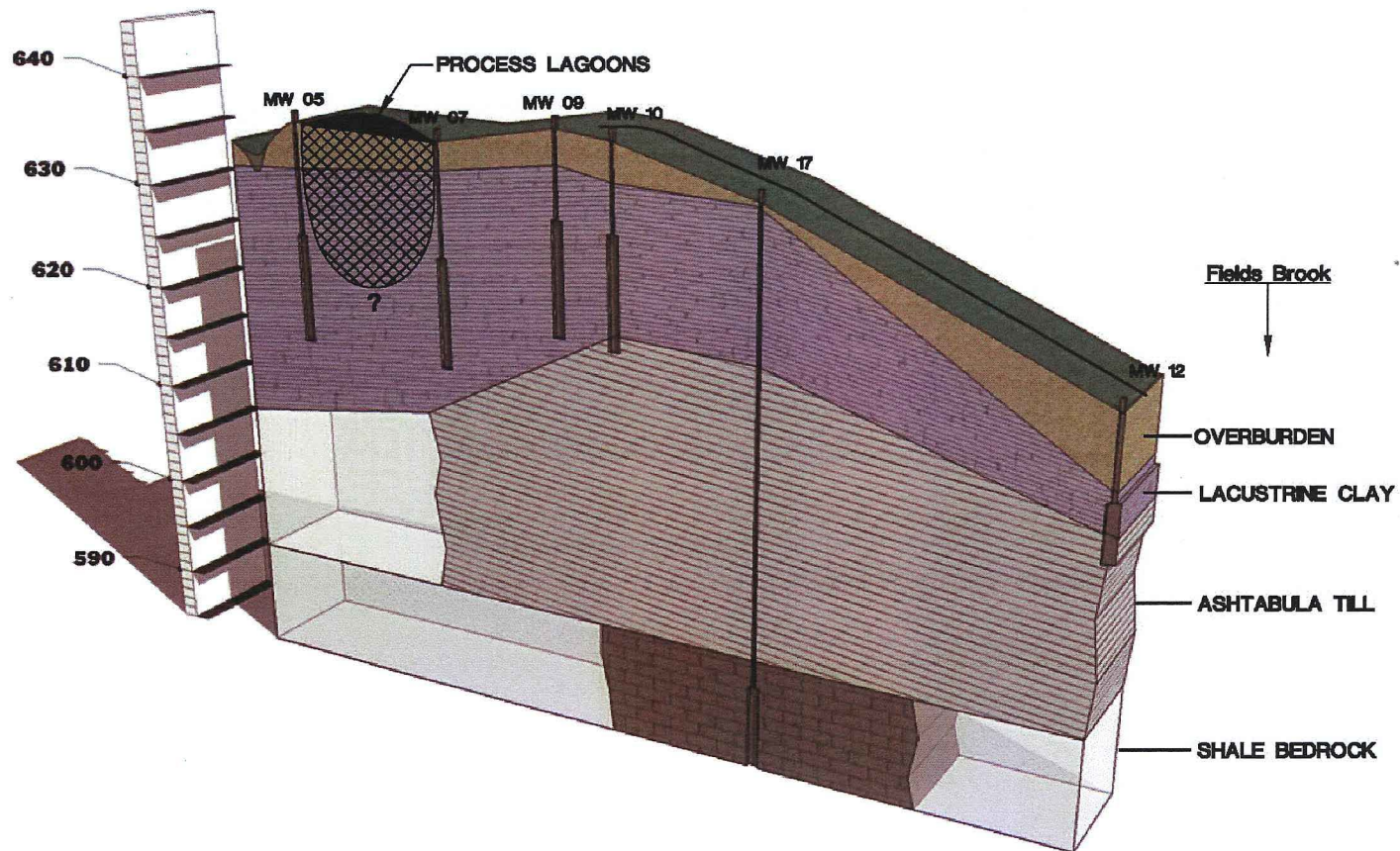
- **Geologic site model was incorrect**
- **Depiction of DNAPL “plume” was incorrect**
- **Slurry wall was installed in wrong location**
- **No containment between DNAPL source area and Fields Brook**

GEOLOGIC DESCRIPTION OF SITE

Location of Geologic Cross-Section

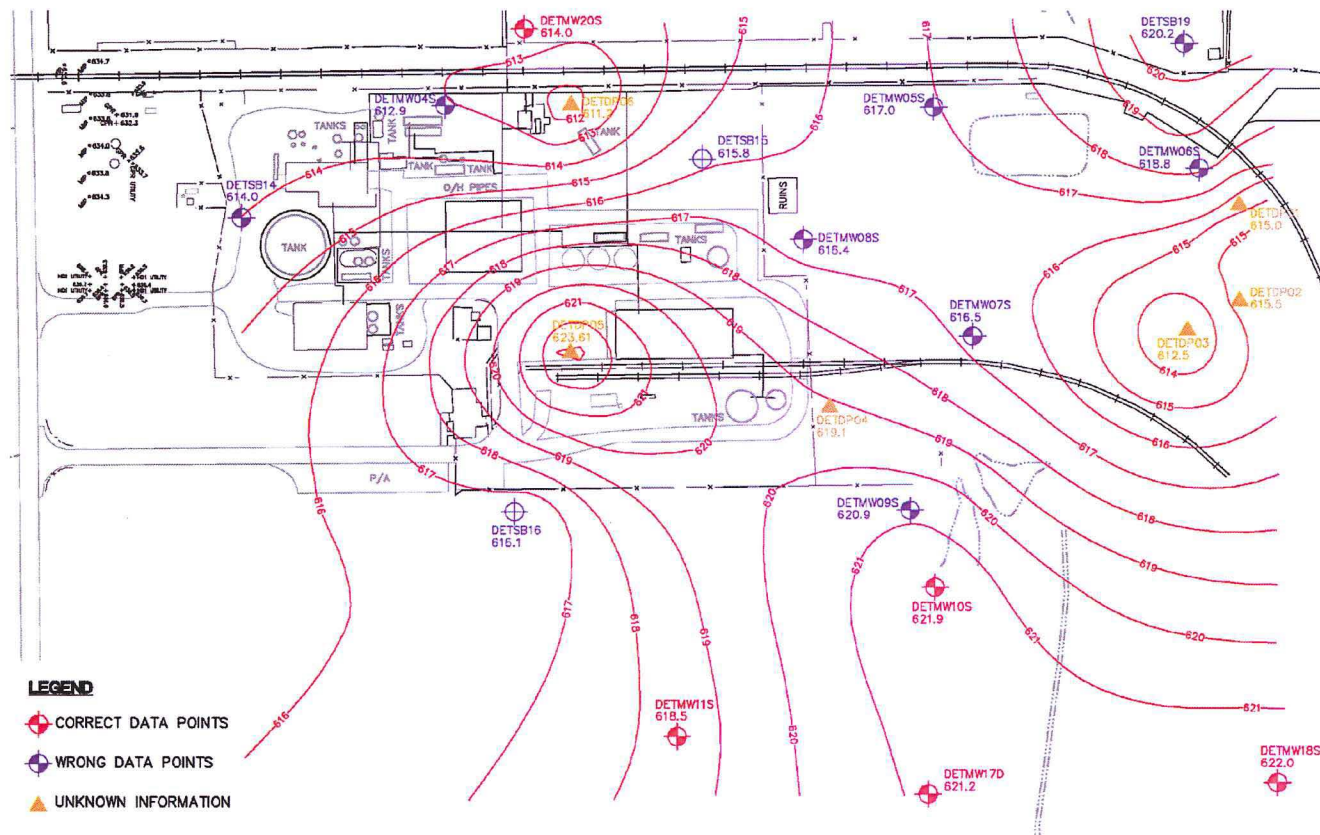


Geologic Cross-Section



**DETREX DEPICTION
OF THE GEOLOGY
WAS INCORRECT AND
NOT SUPPORTED BY
THE DATA**

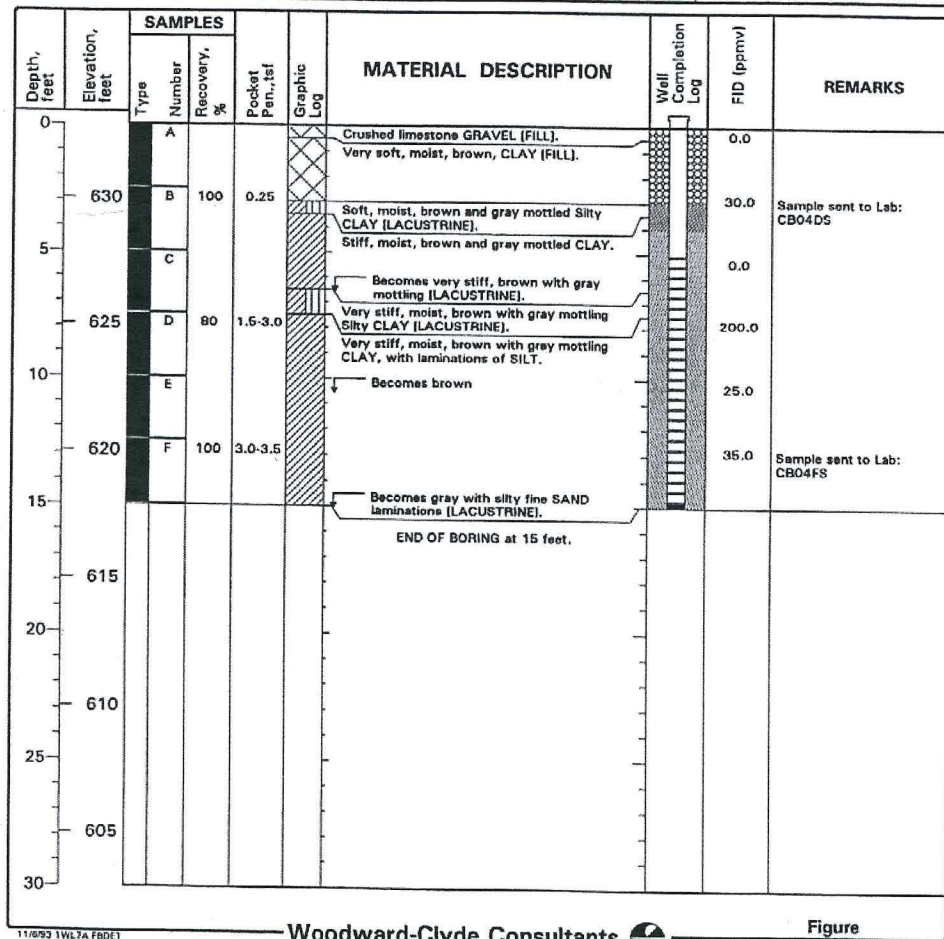
DETREX Top of Till Map Is Incorrect



Project: Fields Brook Superfund Site - Ashtabula, Ohio
 Project Number: 86C3609K
 Boring Location: Detrex Corporation

Log of Boring DETMW04S
 Sheet 1 of 1

Date(s) Drilled	1/4/93, 1/5/93	Logged By	M.T. Schmidt	Checked By	J.A. Ozimek
Drilling Method	Hollow stem auger	Auger Bit Size/Type (in. I.D.)	4.25	Approx. Surface Elevation (feet, MSL)	632.9
Drill Rig Type	Failing F-7	Drilled By	Lahti Drilling	Total Depth Drilled (feet)	15.0
Groundwater Elevation (feet, MSL)	627.30 7/27/93	Number of Samples	Collected: 6 Analyzed: 2	Sampler Type	Continuous sample
Diameter of Hole (inches)	8.25	Diameter of Well (inches)	2	Type of Well Casing	PVC riser /Stainless Steel Screen
Type of Sand Pack	20 mesh	Type/Thickness of Seal(s)	1 ft bentonite pellets.	Screen Perforation	0.010 in.
Comments	Top of Well Casing Elevation (feet, MSL) 634.44				



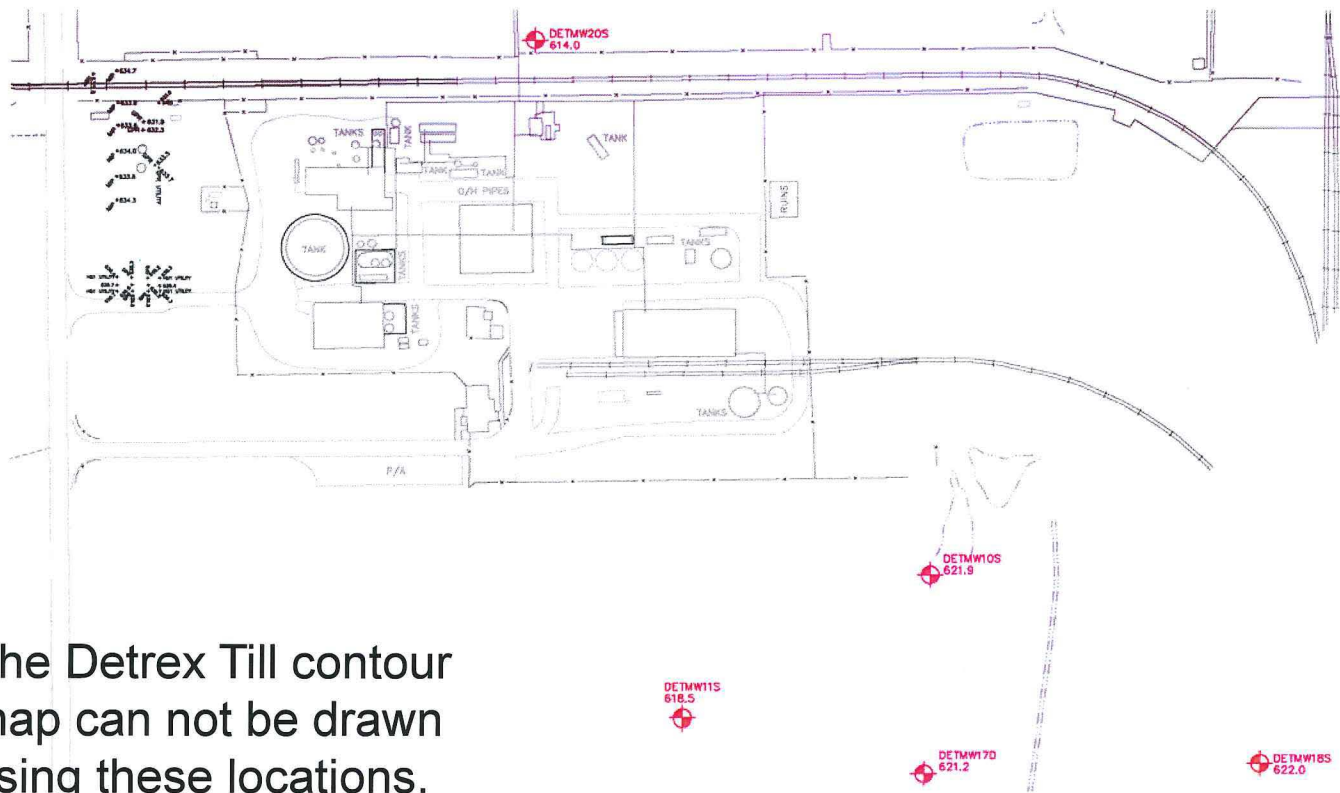
Surface elevation = 632.9 ft

Depth of Boring = 15 ft

Bottom of hole
 elevation = 617.9 ft

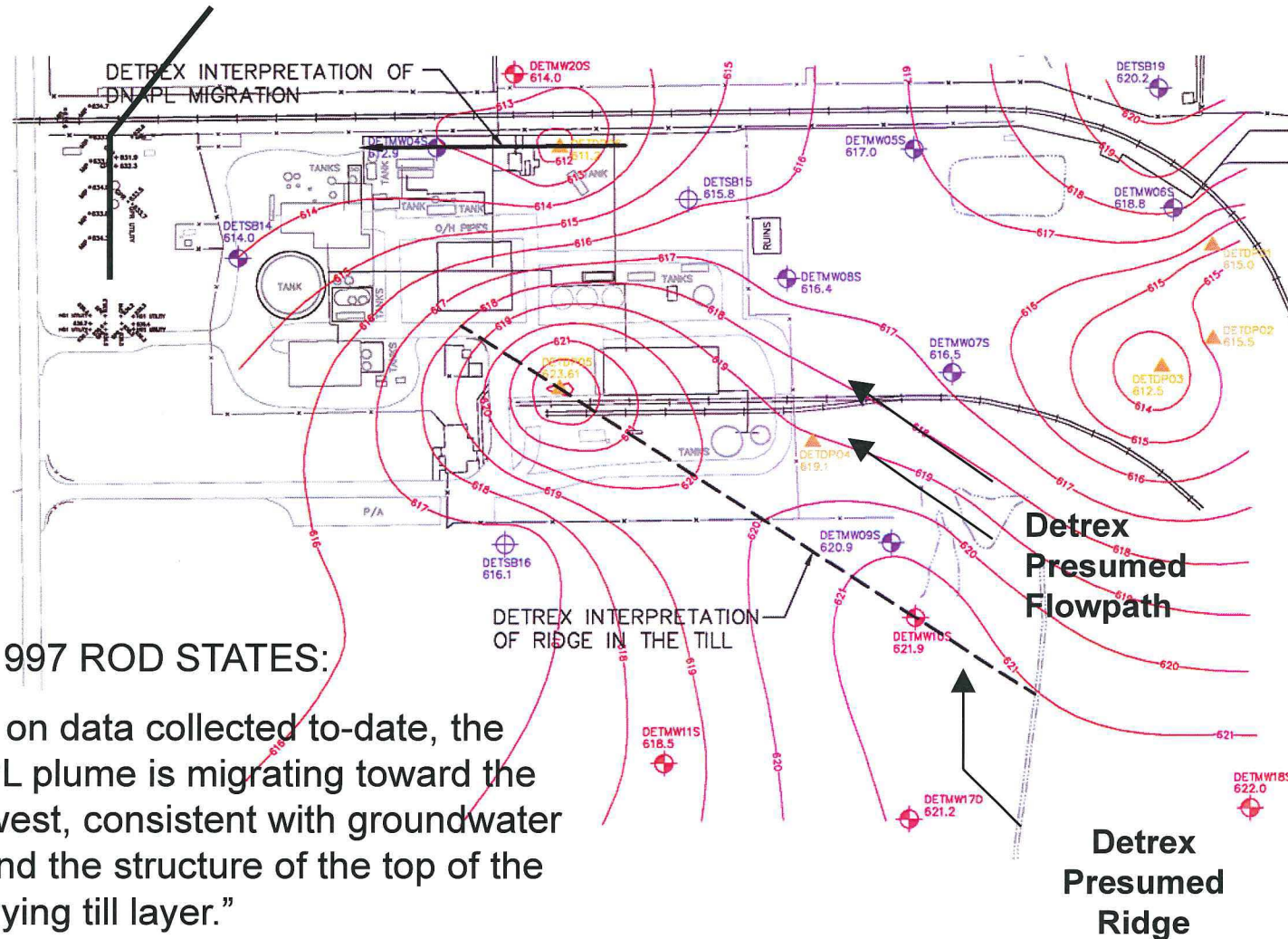
Elevation used on Detrex map
 was 5 ft below bottom elevation,
 id est, 612.9 ft

Actual Well Locations Where Till Was Shown on Boring Logs



The Detrex Till contour map can not be drawn using these locations.

The Detrex Geologic Site Model Was Incorrect and the Ridge in the Till Did Not Stop DNAPL Migration to Fields Brook

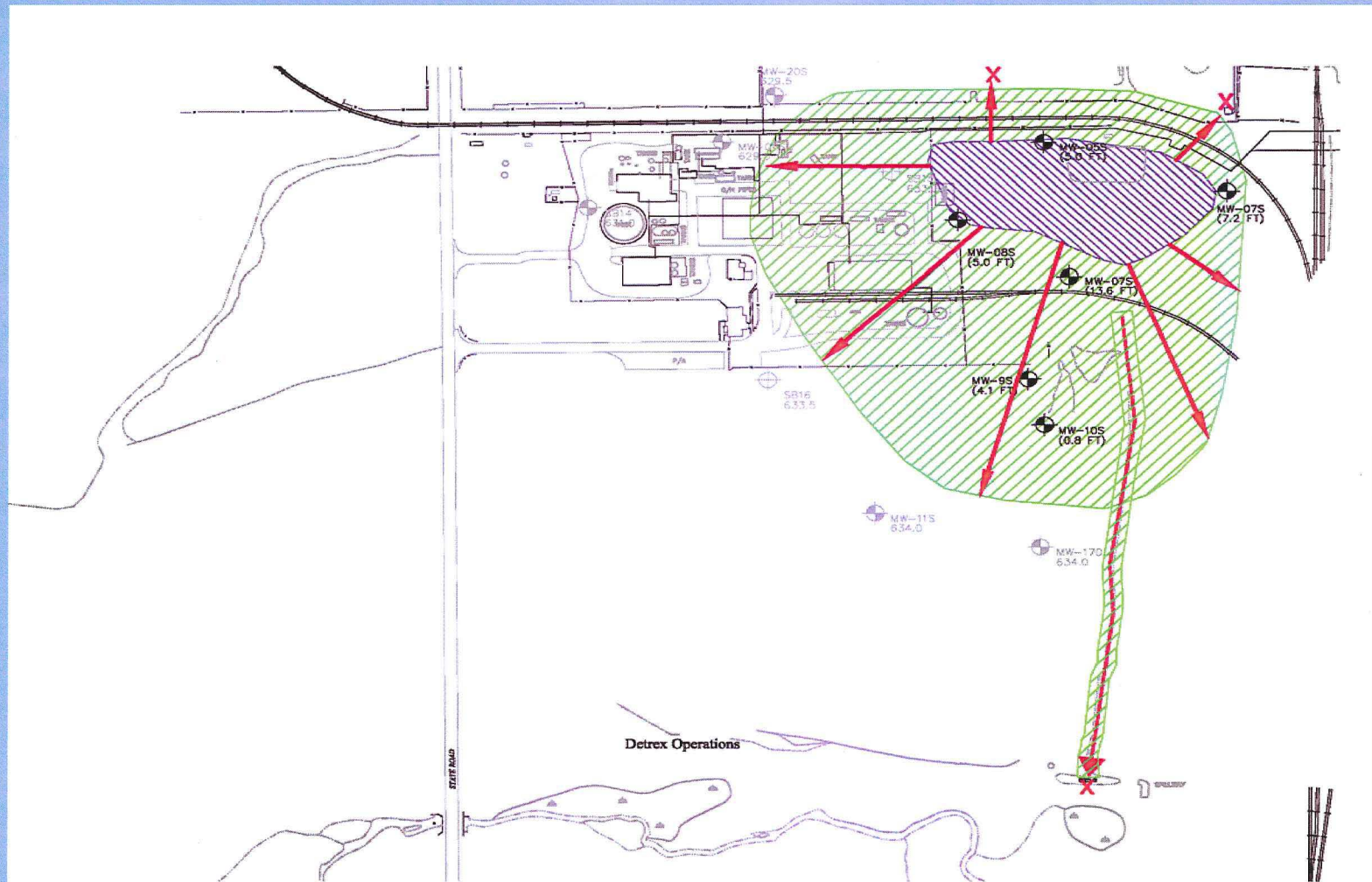


THE 1997 ROD STATES:

“Base on data collected to-date, the DNAPL plume is migrating toward the northwest, consistent with groundwater flow and the structure of the top of the underlying till layer.”

**DETREX DEPICTION OF
DNAPL SOURCE AREA THAT
WAS SUBMITTED TO USEPA
IN 2000 WAS INCORRECT**

Locations of DNAPL Outside of the Detrex Source Area That Were Known in 2000 and Should Have Been Included in the Source Area Depiction

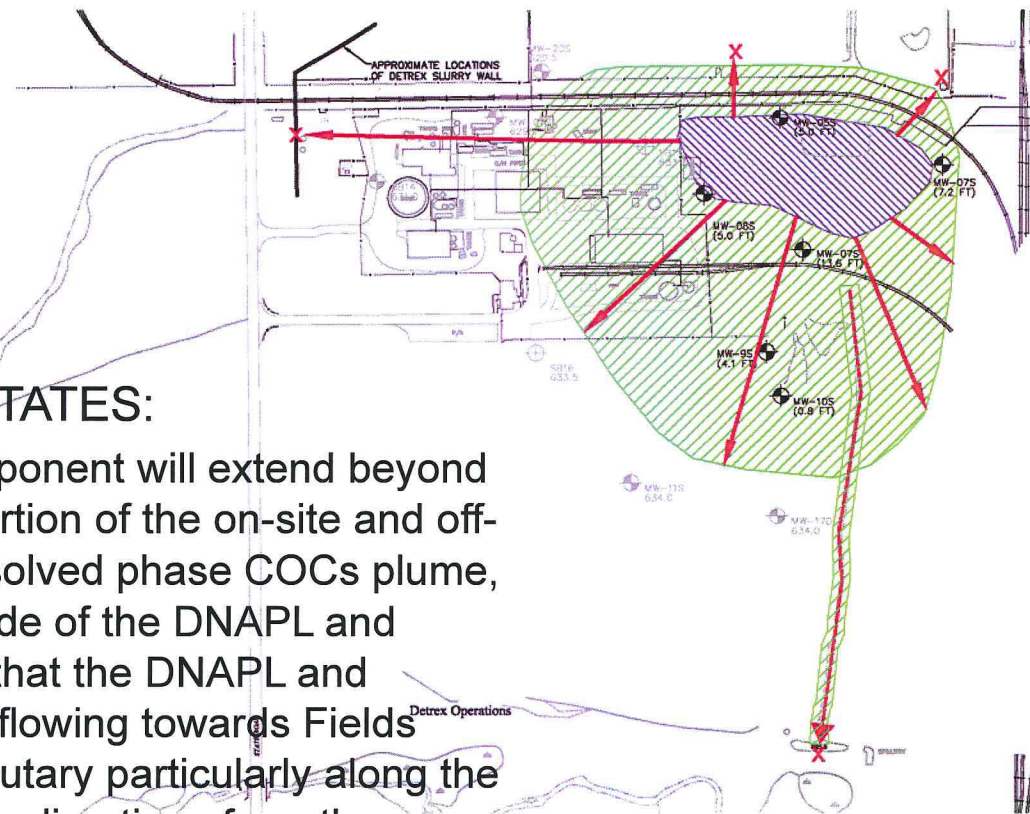


**THE SLURRY WALL IS IN THE
WRONG LOCATION BECAUSE
IT WAS NOT INSTALLED
DOWNGRADIENT OF DNAPL
MIGRATION**

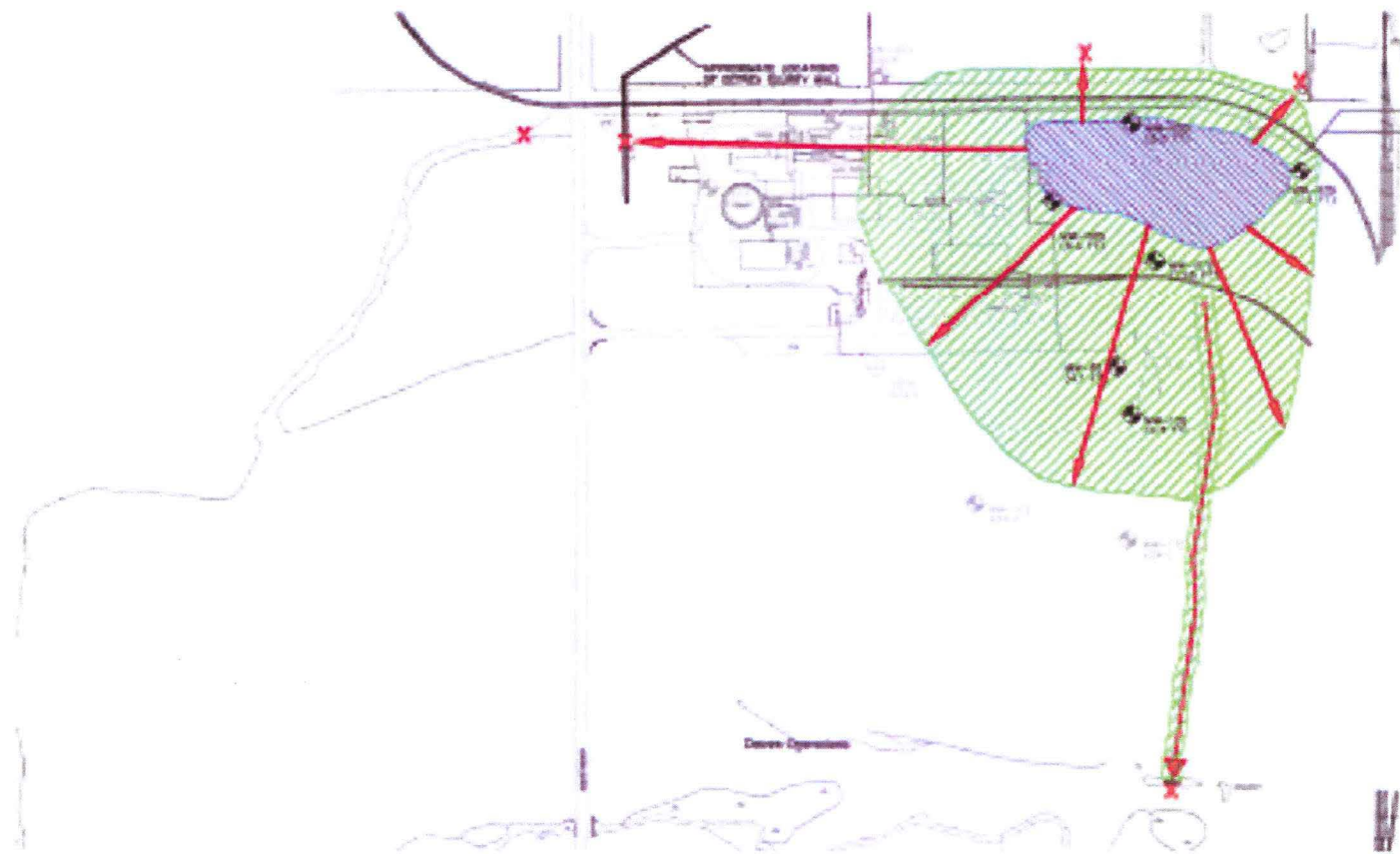
DNAPL Was Found at the Slurry Wall When It Was Installed in 2000/2001 – The Wall is in the Wrong Location

THE 1997 ROD STATES:

“The slurry wall component will extend beyond the downgradient portion of the on-site and off-site DNAPL and dissolved phase COCs plume, and be located outside of the DNAPL and extended to ensure that the DNAPL and contaminated water flowing towards Fields Brook or the DS Tributary particularly along the northern and western directions from the Detrex facility would be contained or captured.”



**DNAPL Was Found Beyond the Slurry Wall in the DS
Tributary in 2005 – The Slurry Wall Has Not Stopped
DNAPL Migration From the Detrex Source Area**



Source Control by Detrex Does Not Conform with the 1997 ROD

- **1997 ROD Requirements for Detrex Source Control**
 - Construct slurry wall (approx 1500 feet long) in a location beyond the leading edge of the DNAPL
 - Compatibility Testing of slurry wall material with DNAPL and other COCs
 - Installation of approximately 40 vacuum-enhanced extraction wells
- **Actual Source Control Efforts 2000 - 2002**
 - Installed a slurry wall (approx. 450 feet long) in DNAPL
 - No compatibility testing
 - Installed 12 vacuum-enhanced extraction wells
 - (Only 3-4 operate efficiently)
 - Extracted approx. 9700 gallons of DNAPL over the 3 years (out of an estimated 250,000 to 500,000 gallons)

TILL LAYER DOES NOT “CONTROL” DNAPL MIGRATION

- **DNAPL migrates on top of the lacustrine clay and through the clay.**
- **DNAPL migrates on top of the till and through the till layer.**

AREA OF PROCESSED LAGOONS

Detrex Operations

DNAPL MIGRATION INTO THE LACUSTRINE CLAY

HEIGHT OF DNAPL IN THE WELL

MW-08S (5.0 FT)

MW-07S (7.2 FT)

MW-05S (5.0 FT)

MW-07S (13.6 FT)

MW-9S (4.1 FT)

MW-10S (0.8 FT)

MW-11S (6.34.0)

MW-11S (6.33.5)

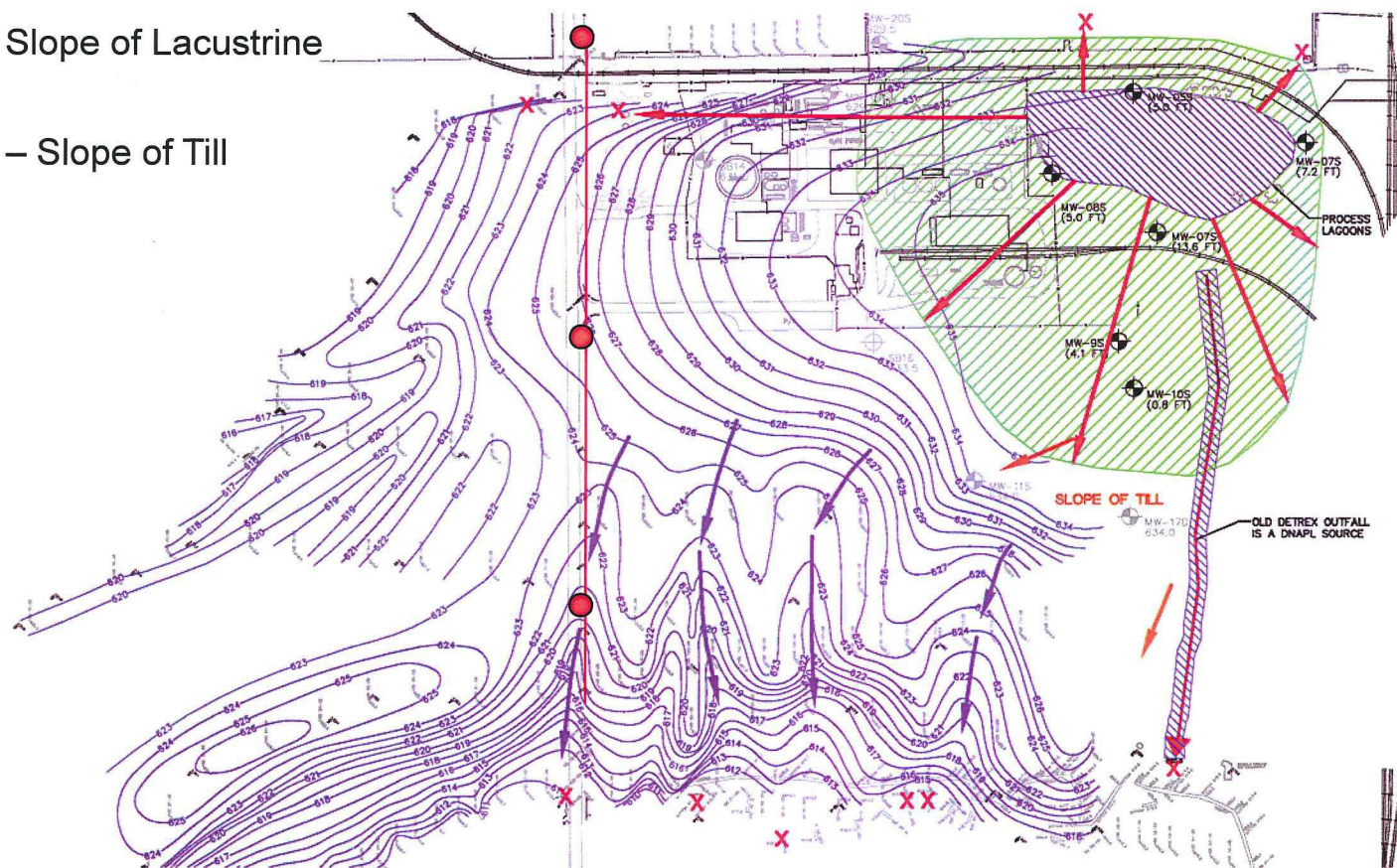
MW-20S (6.33.5)

AREA 4

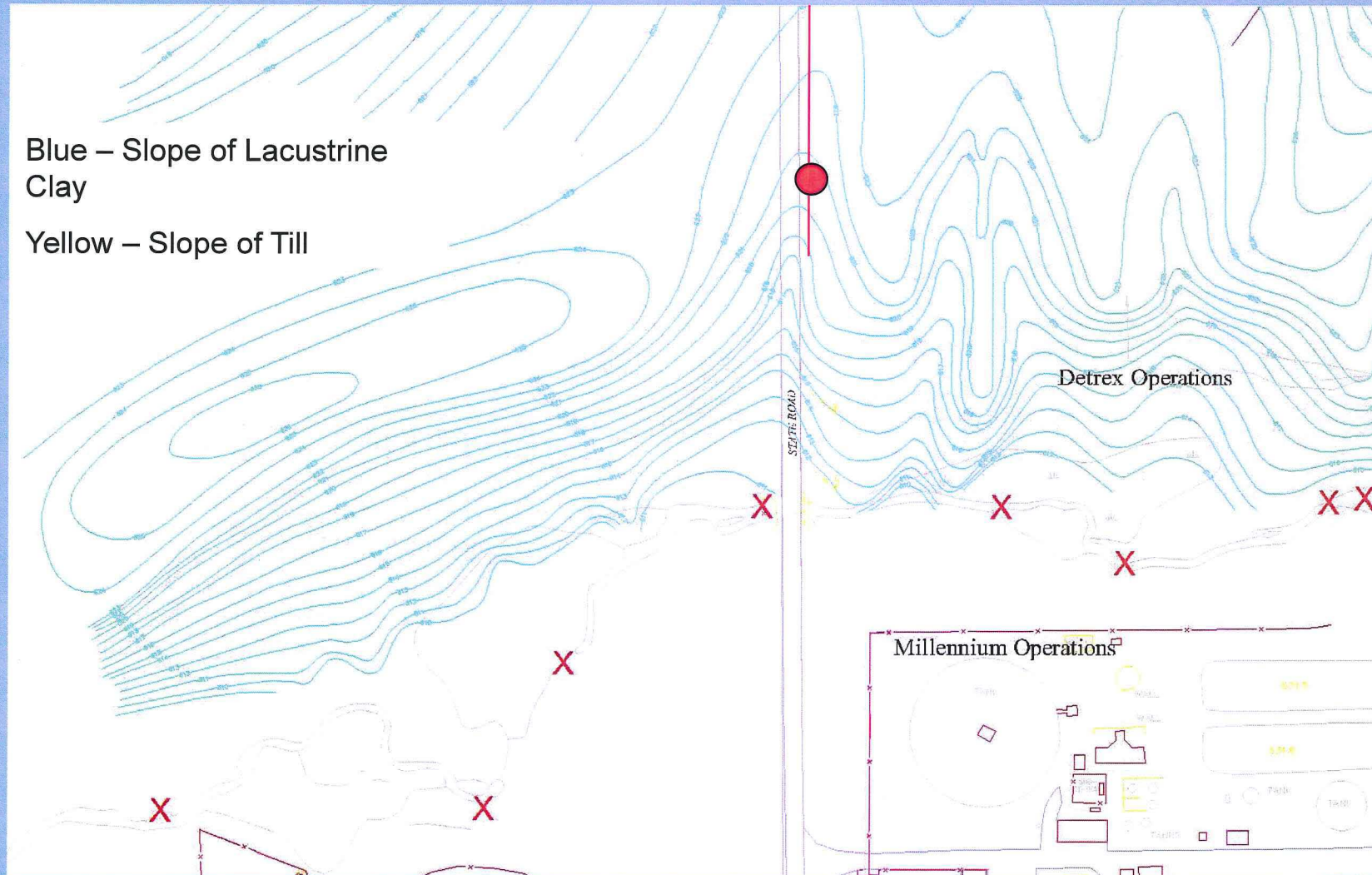
DNAPL Migration From the Detrex Source Area to Fields Brook

Blue – Slope of Lacustrine Clay

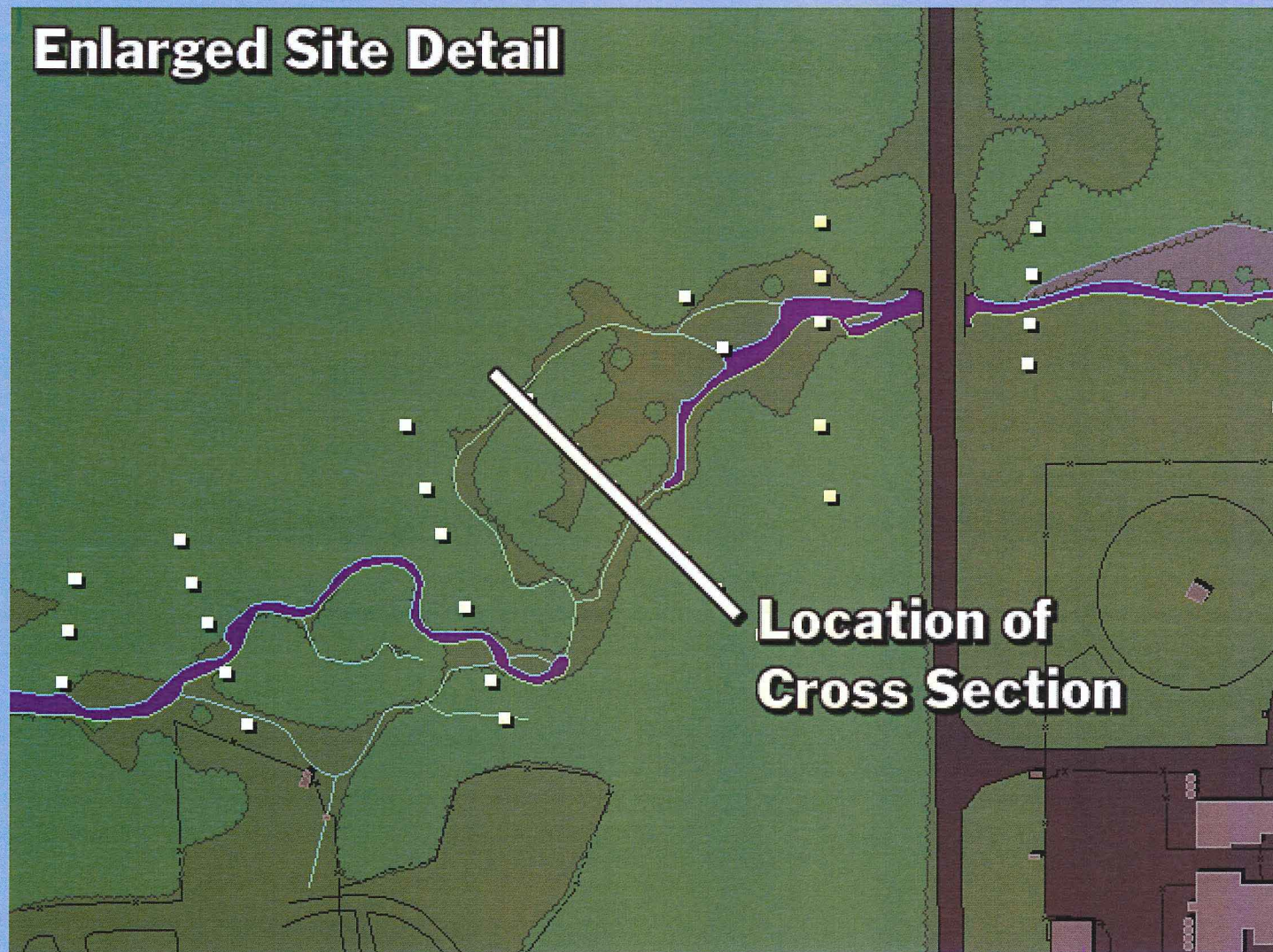
Yellow – Slope of Till



DNAPL Migration From the Detrex Source Area to Fields Brook

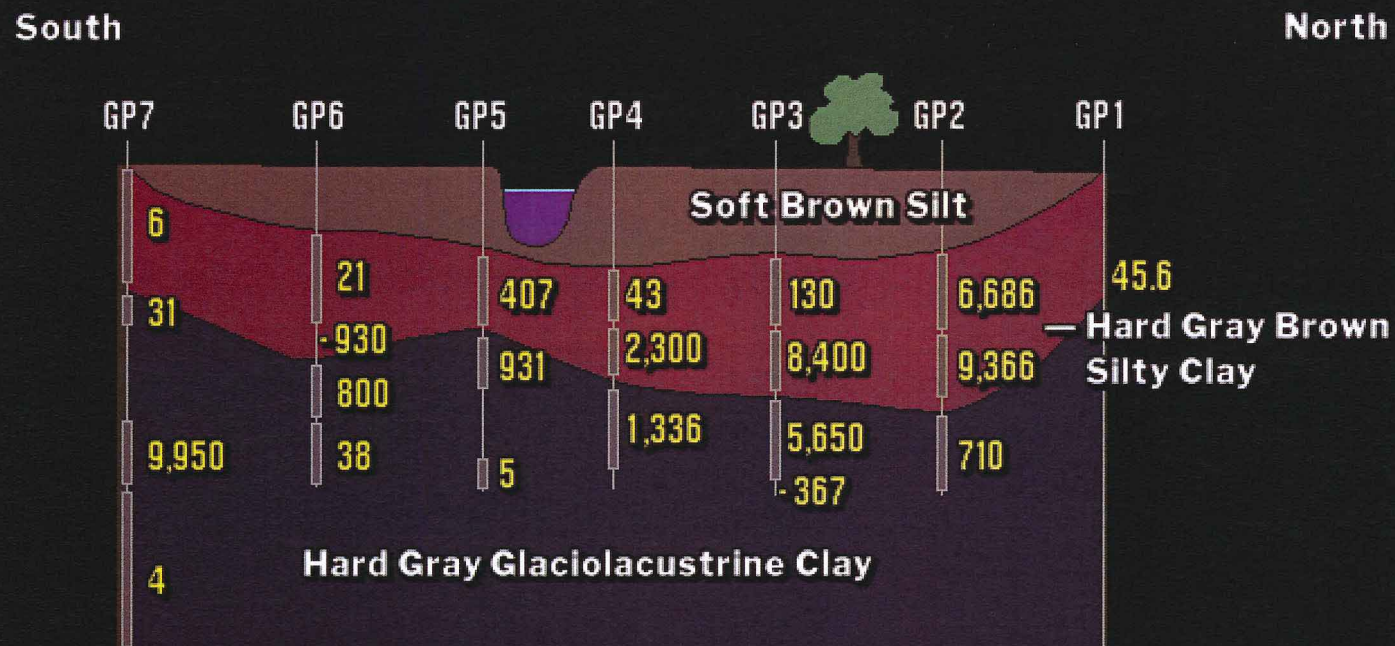


Location of Cross Section through DNAPL



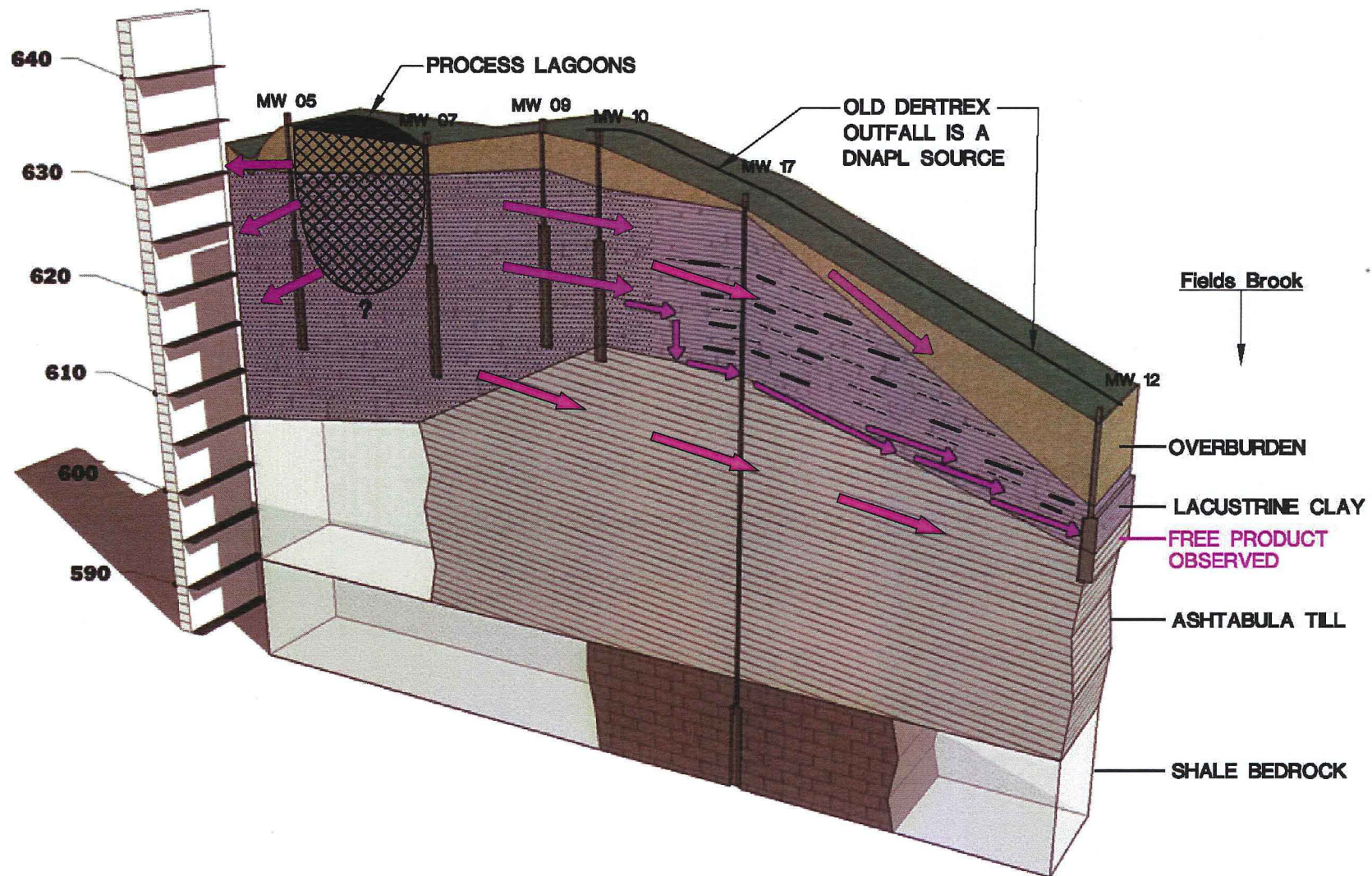
Cross Section View

Cross Section



Geo-Probes: P.I.D. values in ppm

DNAPL Migration From the Detrex Source Area to Fields Brook



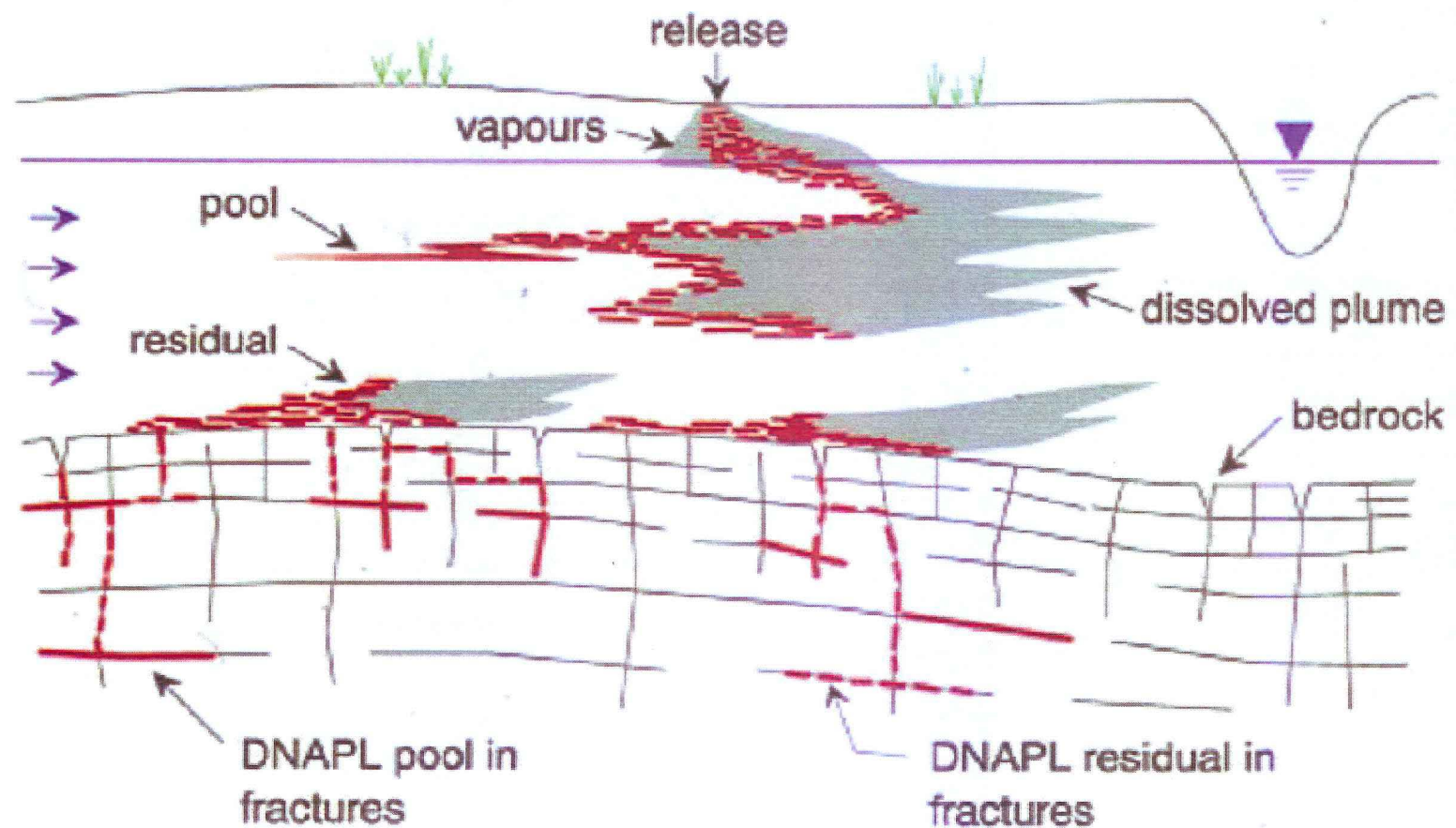
Summary of Detrex Source Control Failures

- **The Geologic Site Model used by Detrex was incorrect – DNAPL migration to Fields Brook is continuing**
- **The map of the DNAPL “plume” submitted by Detrex to U.S. EPA did not encompass the entire DNAPL source area**
- **The slurry wall was installed in the wrong location, and DNAPL migration to the DS Tributary continues**
- **There is no source control between the DNAPL source area and Fields Brook, and DNAPL migration to Fields Brook continues**

Characteristics of DNAPL

- DNAPL occurs in two forms: (i) residual DNAPL, and (ii) pooled DNAPL
- Residual DNAPL – disconnected globules that are immobile
- Pooled DNAPL will continue to migrate until it reaches a state of equilibrium (pool provides driving force)

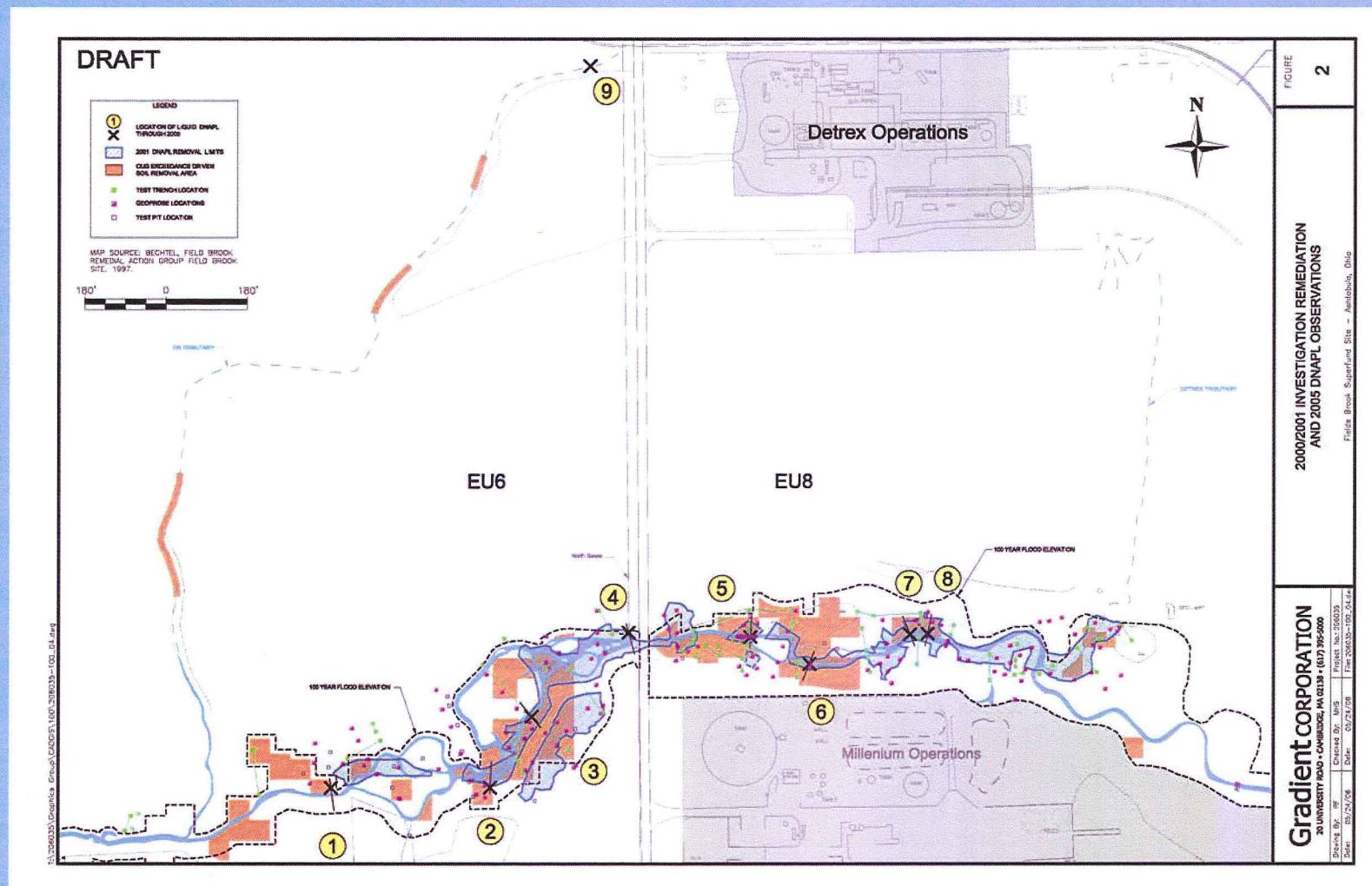
Residual and Pooled DNAPL



DNAPL Migration Patterns

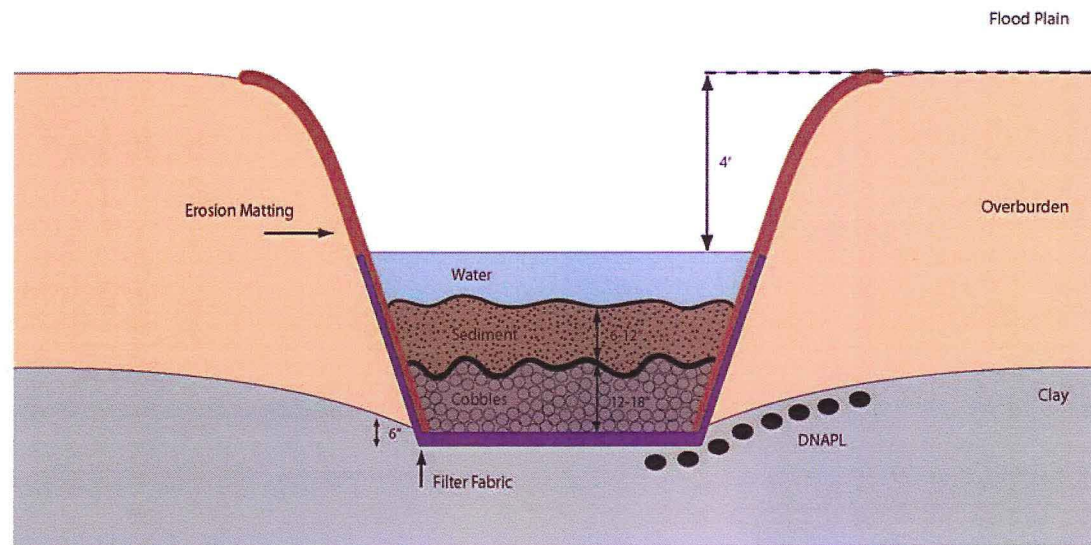
- **DNAPLs migrate in a very tortuous, heterogeneous fashion**
- **DNAPL migration pathways are not correlated with groundwater flow**
- **Residual and pooled DNAPL rarely observed at sites (EPA, 1992)**
- **DNAPL source areas are not 'plumes' (DNAPL is distributed heterogeneously)**
- **The fact that DNAPL found in wells at Detrex indicates very large quantities are present at the facility**

2005 DNAPL Observations



Restored Brook Cross Section

Figure 3
Conceptual Post Remedy Cross Section of Fields Brook



Conceptual x-Section Fields Brook Post Remediation.pdf

DNAPL in Floodplain/Brook in 2005

- **DNAPL found 6'–8' below ground surface in floodplain (2'–4' below stream bed)**
- **No evidence of 'top–down' migration from streambed**
- **Subsurface migration pathways: top of clay and till, sand seams and fractures (historically and at present)**

Trenching Activities



Sheen in Trench at Various Locations



2001 Remediation met or exceeded EPA approved cleanup standards in SOU and FWA

- SOU: All sediment in SOU within EUs 6 and 8 excavated and replaced with clean materials
- FWA: Comprehensive investigation undertaken to define DNAPL areas
 - 51 test pits/trenches and 122 Geoprobes
 - Visual DNAPL and PID headspace recorded
 - Cut lines defined using these data

2001 Remediation met or exceeded EPA approved cleanup standards in SOU and FWA

- Conservative approach used to remediate FWA
 - Excavation extended beyond cut lines if mobile DNAPL observed or PID head space > 500 ppm
 - PID threshold of 500 ppm was conservative and removed residual DNAPL, whereas 2001 ESD only required removal of mobile DNAPL
 - Excavation extended up to 3 feet into lacustrine clay, whereas ESD only required excavation to extend 6 inches into clay

2001 Remediation met or exceeded EPA approved cleanup standards in SOU and FWA

- EPA acknowledged that “DNAPL impacted soils would be left behind” in the FWA
- The 2001 ESD stated that this would be consistent with the “depth of scour” approach
 - “because the residual contamination is below a depth where human contact is likely”
- Selected remedy was predicated on Detrex preventing migration of new DNAPL from its source area

DNAPL left behind in the FWA could not account for 2005 DNAPL observations

- Residual DNAPL by definition consists of disconnected globules and is immobile
- There are no data to support that pool(s) with sufficient mass required to account for the 2005 DNAPL observations were left behind